

UNLOCKING the KNOWLEDGE GENERATION and eLEARNING POTENTIAL of CONTEMPORARY UNIVERSITIES

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Abstract: The purpose of this paper is to argue that what universities need at present is an informed direction and vision about the current impact of information and communications technologies on learning in relation to the design and management of information, electronic teaching content, how knowledge is constructed online, how such a vision ties in with both face to face and online learning, and how these factors as a whole ultimately contribute to the long term viability of universities as educational providers.

It is increasingly clear that online learning is growing in strategic importance for higher education institutions world-wide. It is also clear that resolving related issues and meeting emergent needs such as individualised online content delivery and facilitating creative online knowledge construction extend well beyond just supplying technology and related infrastructure. However, a full examination of all known issues is not intended or possible within the confines of one paper. More specifically, the aim of this paper is to draw attention to the core factors that have already shaped the future direction of higher education throughout the world. As a way of highlighting the extent of change that must be addressed in the short term, the many issues and concerns raised by an Australian national group of academics and government representatives known as the eLearning Roundtable will be outlined as an invitation for further discussions and comment. Finally, a summation of all the factors raised in this paper will serve to build a valid foundation on which to advance future research directions and strategies for ensuring the higher education sector will remain relevant to the shifting demands of the twenty-first century.

Introduction - The Complexity of Delivering Education in a Digital Age

Computers have influenced almost every facet of our lives including the way we view the world around us. Information and communications technologies (ICT) have pervaded our world to the degree that a growing proportion of human activity is now knowledge work (an economy of ideas) in contrast to physical work. Over the past ten years or so, we have witnessed the widespread integration of information technology systems into classrooms, libraries, homes, businesses and communities. In effect, there is no industry or enterprise that is untouched by the persuasive influence of the information revolution (Vande Moere, 1998, p 81). In turn, the use of ICT in education has led to unprecedented access to vast repositories of information paralleled by a pronounced transformation in the type, production, and ease of access to high quality learning resources.

High on the list of priorities for any educational institution that seeks to improve the quality of student learning should be a comprehensive research programme for realising the advantages of seamlessly integrating ICT with learning. The preferred core focus of this research is to identify and explore the educational benefits of applying advanced delivery techniques, new design methodologies, and technology enhanced pedagogical strategies to the complex task of delivering learning solutions tailored to the specific needs of all individuals. The fundamental problem however, is that for the most part, the current use of educational technologies is directed toward deriving a plausible purpose rather than determining how the same technologies may assist to enhance learning (Allen & Seaman, 2006, p 9; Candy, 2004, p 165 -66; Dreher, 2006). Instead of posing the question “how can this technology be used?” a more appropriate question should be along the lines of: “what is it about the learning process that needs to be improved?” The question that naturally follows is “in what ways might the technology enable such improvements?” Taking this line of thought further, analysing such questions naturally gives rise to the question of “how is it possible to derive knowledge from a vast storehouse of disorganised data and information that is expanding at rates impossible for any individual to process?”

The question of the long-term sustainability of universities as innovators in the generation of knowledge and the adoption of new learning strategies has also become a crucial issue in preserving their role as providers of world class education. Furthermore, there are a number of global factors that must be resolved if universities are to meet the demands of a ‘knowledge-based’ economy (Brown & Adler, 2008). The inevitable consequence of

these mounting pressures is that universities must engage with the new technologies so that they remain relevant to the needs of the current and the next generation of learners, and to leverage the potential of ICT in particular as a means of enhancing the quality of learning.

Over the course of the coming decade, technology will play a major role in breaking down the entrenched barriers instilled by industrial-centric thinking that are not only unsustainable, but will prove inadequate for resolving the educational needs of the twenty-first century. (Tiffin & Rajasingham, 1995, pp 1, 48, 57 and 73; Taylor, 2001, p 1; Taylor, 2002, p 4; Greater Expectations National Panel, 2002, p iii; Frand, 2000, pp 17, 24; Wenger, 2005, p 10.). At the local, national, and international levels, it is likely there will be networked groups and organisations made possible through inter-institutional cooperation; a blurring of knowledge boundaries due to the interplay between highly advanced learning environments and instantaneous access to vast repositories of networked resources. Educational institutions may one day become 'virtual' communities of learning. Then, as new forms of delivery are devised, the purpose of learning will be tested against the demands of society, the influence of new technologies, and the global economy (Candy, 2004, p 232; Marginson, 2000; Guile, 2003).

However, if learners are to be skilled in learning and deriving new meanings and understandings, then software systems that interact with the investigative process and provide immediate feedback must be supported. To facilitate the delivery of educationally effective online learning environments, current solutions must be extended to include support for the enhancement of metacognitive thinking skills acquired through direct 'intelligent' interaction between individual learners and software systems designed for this purpose. Intelligent learning systems should be viewed as an integral part of a range of strategies for resolving a universally acknowledged need to manage and process exponentially expanding repositories of information and knowledge. This would empower university staff and students to perform more efficiently and accurately by interactively assisting them to apply their existing knowledge and expertise to improving their information management, knowledge construction and cognitive processing capabilities.

If the implications of technology-directed change are ignored, especially in relation to learning, then the task of managing an exploding information and knowledge base will soon be insurmountable. As Hill and Hannafin (2001, p 1) observe, while the potential of today's technologies for enhancing teaching and learning may be substantial, it may also be the case that current educational practices will be inadequate for preparing graduates to work and learn in an information-centric world. It is also significant that education in general is still described using the language and metaphors of the industrial era, and school organisations continue to reflect the practices and beliefs of the industrial model. A failure to utilise fully the power of information technology in most curricula is the result of a mismatch between traditional organisational values and the values ascribed to new technologies (Vrasidas & Glass, 2000, p 58).

To improve old ideas that have been successful or to invent new ideas has become a key feature of successful economies (Ward, 2004). In practice however, creating new ideas is not always a simple task. A sole focus on innovation is an oversimplification as most often the roles of creativity, design and learning are ignored or dealt with as peripheral issues. The role of knowledge construction, which is fundamental to these processes, tends to be neglected or misunderstood. Moreover, there is little doubt that universities must engage with online learning to remain relevant to the needs of the current and next generation learners, and to leverage the potential of educational technologies that enhance the quality of their learning. The question is how well will individual university's respond to the challenge – organisationally and educationally – and how will their responses shape students' innate learning experiences and enhance their ability to create knowledge? The first step in this complex process is to identify the issues and concerns that are now at the fore of university thinking in Australia.

Issues Arising from the eLearning Directions Research Roundtable

On the 20th of November, 2006, the inaugural eLearning Research Roundtable was convened in Canberra to initiate discussion on the status of eLearning in Australia and to identify future directions for research and development in this field. Strong support for the Roundtable was reflected in the broad range of interests and diversity of the group which included the K-12, VET, and higher education sectors along with representatives from State and Commonwealth agencies. The functional interests represented comprised researchers, managers, practitioners, IT specialists and policy developers. In total, 41 people are now collaborating to progress research and practice in education throughout Australia over the next decade. The main issues identified by the group for priority action and further research include:

1. Develop an underlying theory/pedagogy to establish future educational effectiveness:
 - What can Universities offer in terms of new eLearning pedagogies, design models and theories that will be essential for ensuring students' current and future needs are met?
 - What are the future learning needs of students? Personalised and student-centred learning are becoming a priority. One strategy is to facilitate student co-creation of learning environments, and account for student mobility and transition needs.
 - It is increasingly important to evaluate the quality of student learning assessment: assess the assessment, so to speak
 - Are current models of research and evidence production effective in assisting universities to stay abreast of rapid change?
 - Most ICT related developments are occurring without significant interaction at the teaching/learning and research nexus even though there are similar technologies to be explored and exploited, and similar problems to address in relation to the known barriers to adoption.

2. Address the challenges educationalists encounter when working with IT designers and developers:
 - What will the interactions among lecturers, students and designers/developers look like in education in five years? What will be the priorities and which groups will dominate these discussions and the resultant decisions that ultimately affect all parties? Consider for example:
 - eLearning innovation in higher education is constrained due to the isolation of LMS practice in universities – there is little communication across institutions
 - Currently technologists, not educationalists are the agenda setters – as students' needs become more dominant, this situation will not stand the test of time.
 - Too often, the student voice is missing in learning software design. Most do not want to use 'our' technologies. The trend is that students are bringing in their own technologies and voicing their preferences for technologies that are readily available on the web – for example, Myspace, YouTube, and iPods.
 - There is a tension between flexibility of use and ease of management as evidenced by the inability of educationalists to access university computing services for experimental research
 - In order to accelerate the creation and implementation of new eLearning solutions, there is a need to officially recognise and support leading-edge research on information and knowledge management, knowledge generation, and establish the appropriate mechanisms for communicating key findings to inform executive level policy decisions.
 - There are few support services available to expedite the establishment of research partnerships without exposure to excessive bureaucratic processes. As a result, potential new partnerships and collaborations (particularly with industry partners) are being deferred and/or withdrawn due to time-consuming administrative overheads and costs.
 - Leadership education and advocacy are vital to progressing senior managers' understanding of eLearning practices and priorities (from the educationalist's perspective) to support and inform their decision-making.

3. IT specialists draw mainly on their own learning experiences and rarely engage in educational discourse:
 - The discourse and 'cultural' barriers between pedagogy practitioners and information technology staff (for example, programmers) must be overcome. Greater involvement in technical and software developments from pedagogy people is essential.
 - In recent years, a shift in policy has occurred across the university sector that has characterised the globally acknowledged use of ICT for knowledge production, dissemination and management as 'problematic' stemming mainly from the difficulties of controlling the risks associated with ICT use. As a result, leading-edge eLearning exploratory research and application has been suppressed by a perception that the campus wide enterprise model must dominate all ITC related decisions and make no allowance for accommodating the research and adoption of campus-bred developments.
 - How can the different languages and terminologies used by technologists and educationalists be managed? How can communication and collaboration between technologists and educators be facilitated? For example, there is a need to be aware of how teachers receive, perceive and manage these developments where the focus should be on convenience and ease of use for the teacher.
 - Although there is broad agreement on the need for pedagogy, there is also considerable diversity in teacher practices that has led to ambiguity on the implications and effectiveness for teaching and learning that are often taken for granted by educationalists, yet has not been clearly captured in the available documentation.

- To leverage full value from investment, does technology have the potential to be used for more than learning or the delivery of teaching. That is, what else can the technology be used for?' Some immediate examples include knowledge management and sharing, and data mining to generate new knowledge and innovation.
4. The overwhelming consensus is that the days of the proprietary LMS platform are limited. There is a clear need for:
- An acceptance that technology does matter – this factor is no longer in question
 - Many universities have assumed a culture of isolation from the Internet which is increasingly at odds with a world that has become highly interconnected where new ideas and innovation continually arise from greater exposure to diverse sources of information and an increased capacity to recognise unforeseen opportunities. This culture is driven by administrative fear and risk aversion that has led to excessive filtering, restrictive access privileges, and the subsequent diminished opportunities for generating the type of innovative thinking that leads to new knowledge.
 - The next wave of eLearning systems will be in providing unrestricted connection, which has now become the accepted standard outside of universities. More interoperable systems are needed that facilitate modularisation and therefore flexibility in delivery. For example, the establishment of a federated learning object repository that utilises open standards and open source approaches to development and sharing are critical to ensuring the quality of teaching resources and the success of student learning.
 - Truly flexible systems however, are still some way off and therefore require additional research evidence to inform the development of such systems
 - Acknowledging that some institutional internal processes lack the flexibility and responsiveness required to efficiently respond to this increasingly dynamic field
 - Greater involvement by stakeholders (teachers, lecturers, students) is essential and must be encouraged. Already, there are IT solutions that are innovative in the sense of enabling new ways of distributing work between teachers, students, and technology such as content management systems and learning object technology
 - There is considerable evidence that Web 2.0 has become the new 'public space' for learning. For example, the use of Wikipedia as a content creation and organisation tool, not just as a reference encyclopaedia, points to the strong usage and showing of Wikis due to the Web 2.0 phenomenon where online collaborative authoring is rapidly forging a path in higher education.

All members of the eLearning Roundtable share a common vision to progress the current understanding of how recent and emerging technologies can enhance the learning process and provide insights into the opportunities for devising future learning environments. In forming this vision, the group emphasised that the directions and developments in eLearning to date have impacted and will continue to impact on all areas of education and training in ways that are yet to be fully understood. The issues and concerns identified by the group not only add weight to the factors outlined at the beginning of this paper, but also introduce additional complexity to the challenges the higher education sector must confront over the coming decade. For this reason, new research directions must be prioritised to assist in unravelling the difficult task that lies ahead.

New Research Directions and Outcomes

It is imperative that universities stay abreast of new technological developments and aspire to cutting edge leadership in the application of ICT to education, research, knowledge construction, and information management. This vision can be realised in number of ways (in no set order):

- provide ubiquitous, reliable access to digitised materials and information so that every user – whether learner, researcher, teacher or administrator – is provided access to state-of-the-art technologies that support and enhance their workflow, knowledge construction and study activities
- further enhance information retrieval and processing, and learning delivery strategies by incorporating intelligent machine-to-machine and human to machine dialogue systems, thus freeing the user to apply and benefit from the use of information in more productive ways
- improve student learning through the provision of autonomous, interactive learning experiences that are supported by dynamically assembled, fully customised learning environments where the focus is on the preferences and needs of each individual

- broaden student access to high quality learning materials and services that facilitate greater choice of access regardless of time and location
- gain greater insight and knowledge on how emerging technologies may underpin innovative teaching, learning, research and administrative practices
- devise 'intelligent', next-generation' technology enhanced learning and research tools (enabling technologies) and,

To ensure successful implementation, the research priorities outlined above must be underpinned by a multi-disciplinary, educationally focused ICT programme that incorporates effective knowledge management strategies that are organically interwoven with innovative design methodologies and learning pedagogies tailored to the flexible delivery of both on-campus and online learning modes. The success or failure of an educational institution in a future where knowledge and content will be viewed not only as 'marketable products', but will also be the measure by which its reputation is judged rests largely on a capacity to:

- generate new knowledge as an integral part of a comprehensive educational/ICT research strategy
- invest in the necessary infrastructure and resources that guarantees stable support for the efficient and effective management of content and knowledge
- recognise and realise the market potential of its information and knowledge 'assets'
- ensure the quality of the teaching content and knowledge produced is constantly measured against the highest standards of quality and excellence.

Conclusion

Over the past 10 years, a major shift in thinking from an economy of artefacts to an economy of ideas has emerged as the dominant differentiator in ensuring commercial success. It is not immediately obvious that this is the case and consequently, many educational practitioners continue to apply traditional learning strategies and ideas to resolving constantly changing demands and conditions. Without realising it, an economy of ideas has affected everything we have known in that it is unlike anything that has been experienced in the past.

In order to generate new, or to refine and combine ideas in ways that deal with an increasingly complex world in a sustainable manner requires a new approach to the delivery of learning. To better reflect their primary function, such solutions should perhaps be referred to as 'knowledge spaces' in which ICT dynamically combine to facilitate the connections between nodes of people and assist to manage the concepts, abstractions and patterns that naturally emerge through human interactions and information exchange. In developing knowledge spaces, the teaching and learning challenge is to master new and complex information structures as well apply the technologies and interpretive skills required to construct new knowledge in creative and productive ways. This means that not only is there a need to re-think the design of current learning delivery models, but also to re-appraise the nature and purpose of teaching to accommodate highly innovative and adaptive learning strategies.

The implication of these changes for twenty-first century education is that as the focus of learning and economic activity is directed progressively towards conceptual and abstract outcomes, there will be concomitant pressure to deal with even more complex issues and needs. The magnification of this imminent complexity will inevitably cross discipline boundaries in ways that the organisations, institutions, and business structures of the previous century will be ill-prepared for and as a consequence, poorly equipped to manage. The resultant effect will be that the new approaches to learning, research and innovation must become knowledge and idea centric, not simply remain information centric. For this strategy to be successful requires a comprehensive re-evaluation of the role of technology as an aid to learning and its impact on all human endeavours and activities.

In integrating new learning strategies with traditional teaching environments, it is also increasingly apparent that the demand for non-formal learning solutions is at odds with the entrenched institutionalised approaches that have evolved over the past two centuries. Moreover, current applications of technology do not necessarily support the design and application of new learning models as in many instances there has been a tendency to replicate past practices. Therefore, the role of learning must be realigned with an economy of ideas and mapped to an ecological networked community model whilst ensuring traditional models of learning remain relevant to the rapidly changing needs of graduates and society in general. The final words from Mendizza (2004, p 5) provide an insight into how the goals education might be perceived in the future:

The next frontier in education is moving us away from “content” to a rediscovery of the natural unconditioned state of the mind and its limitless capacity to learn. Our forced, compulsive appetite for “information” the endless cycle of cram-test-grade and forget is fading. In its place a new state and a new culture is emerging, present, passionate, curious, open, adaptive, and honest.

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